

# PATENT ABSTRACTS OF JAPAN

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(11)Publication number : 06-175490

(43)Date of publication of application : 24.06.1994

(51)Int.Cl.

G03G 15/08

(21)Application number : 04-351368

(71)Applicant : RICOH CO LTD

(22)Date of filing : 08.12.1992

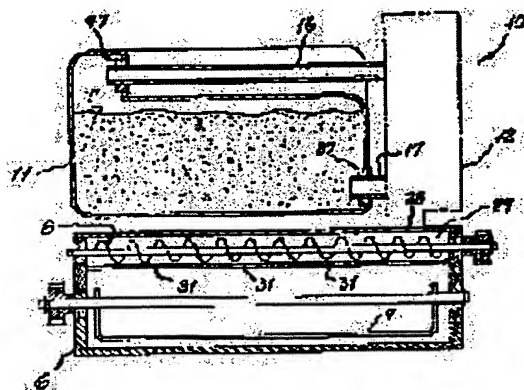
(72)Inventor : YABANETA MASAZUMI

## (54) IMAGE FORMING DEVICE

### (57)Abstract:

**PURPOSE:** To provide an image forming device, in which the toner is supplied automatically and the seal peeling work or the like is eliminated and which can prevent the pollution of the environment and human being by the toner.

**CONSTITUTION:** A supplying toner sucking and supplying device 12 is interposed between A toner supplying container 11, in which the supplying toner T is housed, and a toner hopper part 6 of a developing device. This supplying toner sucking and supplying device 12 generates a suction air flow from the toner supplying container 11 toward the toner hopper part 6, and carries the replenishing toner T with this suction air flow to flow it to the toner hopper part 6.



## LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

[Patent number]

[Date of registration]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to image formation equipment equipped with the developer which develops an electrostatic latent image with a toner.

[0002]

[Description of the Prior Art] Generally with the developer which develops an electrostatic latent image with a toner, the toner for a supplement is supplied in a developer from this container by the thing of a configuration of that a toner is supplied using a toner supply container. Drawing 9 shows an example of the conventional toner supply container, and inside this container 101, as shown in drawing 10, the toner 102 for a supplement is contained.

[0003] Opening 103 is formed in the toner supply container 101, and this opening 103 is blocked by the seal 104. When performing toner supply, a developer is equipped with this container 101, a seal 104 is torn off, and the toner 102 for a supplement is dropped from opening 103 to the direction of a developer.

[0004] In addition, as shown in drawing 11, the shutter 106 formed in the lower part of the toner supply container 105 is pulled out in the direction of an arrow head, and there are some which drop the toner in a container 105 and are put in to the direction of the body of a developer from opening which is not illustrated.

[0005] If it is in such a supply method, the activity which tears off a seal or draws out a shutter is needed, and this kind of supply activity is very troublesome. Moreover, after supply, since opening of a toner supply container is turned down in order to drop a toner using gravity, if this toner supply container shall be taken out as it is, the toner adhering to a toner supply container will become easy to fall by vibration etc., and will soil a perimeter with a toner. Furthermore, the toner adhering to this container soils a hand with a toner about a finger etc. at the time of attachment and detachment of a toner supply container.

[0006]

[Problem(s) to be Solved by the Invention] As the purpose of this invention can perform toner supply automatically, a seal tears it off, and it does an unnecessary thing, and is to offer the image formation equipment which enabled it to prevent the contamination to a perimeter environment, a man, etc. by the toner.

[0007]

[Means for Solving the Problem] The developer which develops an electrostatic latent image with a toner in order that this invention may attain the above-mentioned purpose, It has the toner supply container which contains the toner for a supplement supplied to this developer. So that attachment and detachment are mutually free, and it may connect with a toner supply container so that it may be open for free passage to a toner supply container and a developer, respectively, and the toner for a supplement in a toner supply container may be attracted compulsorily and it may flow to a developer side The configuration of the image formation equipment which attached the toner suction feeder for a supplement which generates suction airstream to the developer is proposed.

[0008] In addition, if the connection between the toner suction feeder for a supplement and a

developer is constituted at least so that a free passage may be severed by the lock out member at the time of suction, it is effective.

[0009] Moreover, it is effective if it will be in an opening condition when the connection between a toner supply container and the toner suction feeder for a supplement is mutually connected in both, it considers as the cap type connection used as an opening blocked state when a toner supply container is not connected, and it is the configuration which prepared this cap type connection in the toner supply container.

[0010]

[Example] Hereafter, the example of this invention is explained to a detail according to a drawing.

[0011] Drawing 1 shows the toner supply section of the developer provided to the image formation equipment of this invention 1 example. It precedes explaining this toner supply section, and the outline of the configuration of a developer is made clear to below using drawing 2.

[0012] Opposite disposition of the developer 1 is carried out at the photo conductor drum 2 which is an example of latent-image support. The development sleeve 5 is supplied the developer of internal binary system being agitated by the churning roller 3 formed in the casing 50 of this developer 1, the churning paddle 4, etc. The developer of binary system is a developer which has a toner and a carrier. Development of the electrostatic latent image formed on the photo conductor drum 2 is presented with the developer on this supplied development sleeve 5. In addition, although this invention is applicable also to the thing using the one component system developer which does not contain a carrier, the developer using a fine-particles-like binary system developer shall be applied for convenience hereafter.

[0013] As mentioned above, although a developer 1 develops an electrostatic latent image with a toner, if the developer 1 provided to the image formation equipment of this example has the toner hopper section 6 connected to casing 50 and runs short of the toners in the developer in casing 50, the toner supply roller 7 of the toner hopper section 6 will begin rotation, and the toner T in the toner hopper section 6 will be supplied to the direction of the casing 50 of a developer 1.

[0014] The toner hopper section 6 is storing the toner T for supplying the casing 50 of a developer 1, and this reservoir toner T is agitated by rotation of the toner churning member 9. If the toner in the toner hopper section 6 is lost or the amount decreases, the purport to which exchange of the toner supply container which the detection equipment which is not illustrated detects this and mentions later is urged will be displayed on the control-panel section (un-illustrating) of image formation equipment.

[0015] Here, drawing 1 is drawing which is in the condition seen from arrow-head A, and made the cross section the toner supply section 10 of drawing 2.

[0016] In this drawing, a sign 11 shows the toner supply container which contained the toner T for a supplement supplied to a developer 1 inside. This toner supply container 11 may be called a toner bottle or a toner cartridge. 12 can show the toner suction feeder for a supplement, and this equipment 12 of each other can be freely detached and attached with the toner supply container 11. Drawing 1 shows the condition that the toner suction feeder 12 for a supplement was equipped with the toner supply container 11.

[0017] If the toner in the toner hopper section 6 is lost or it decreases, as stated even in the top, the display of the purport to which exchange of the toner supply container 11 is urged will be made. This display is seen, for example, the toner supply container 11 is extracted leftward to a user side. Of course, since supply has finished before, there is no toner into this container 11 extracted. Subsequently, the location of drawing is equipped with the new toner supply container 11 with which the toner T for a supplement was contained as shown in drawing. In the state of this wearing, the toner suction feeder 12 for a supplement is made into an actuation attitude.

[0018] The toner suction feeder 12 for a supplement is divided into the upper container 21 and the bottom container 22 as this main configuration shows drawing 3, and the dashboard 13 with which both are divided is formed among these.

[0019] Through bellows 14 and 15, a dashboard 13 is connected with the upper container 21 and the bottom container 22, respectively, and can be gone up and down freely. The pipe section 16

was formed in the upper container 21, and it has extended and come out of this to the direction of the toner supply container 11 ( drawing 1 ). The valve 23 is formed while opening 18 is dug by the wall of the knot of the pipe section 16 and the upper container 21.

[0020] Moreover, the valve 24 which opening 13a is similarly dug by the dashboard 13, and was located in the upper container 21 is formed. The rise-and-fall drive of the dashboard 13 is carried out by the driving means which consists of the disk 25 as shown in drawing 4 , the link lever 26, etc. If a rotation drive is carried out, each edge of the link lever 26 is pivoted by this disk 25 and dashboard 13 and a disk 25 rotates in the direction of an illustration arrow head by the motor which is not illustrated, a dashboard 13 will carry out rise-and-fall migration of the disk 25 through the link lever 26.

[0021] When the dashboard 13 shown in drawing 3 goes up by such driving means, while the valve 23 by the side of opening 18 opens, the valve 24 in the direction of a dashboard 13 closes. Under the present circumstances, the air in the upper container 21 flows in the pipe section 16. That is, a wind is sent from the inside of the upper container 21 towards the pipe section 16.

[0022] The pipe section 17 is formed so that it may be parallel to the bottom container 22 with the pipe section 16, and this is very short rather than the pipe section 16 ( drawing 1 ). And opening 19 is dug by the pipe section 17 and the wall of the knot of the upper container 22.

[0023] Air flows in the bottom container 22 from the pipe section 17 at the same time said ventilation is performed, in case a dashboard 13 goes up. That is, the suction airstream 27 arises from the inside of the pipe section 17 towards the inside of the bottom container 22. The toner for a supplement in the toner supply container 11 rides on this suction airstream, flows in the bottom container 22, and falls from the lower limit opening 28 of the bottom container 22 in the toner conveyance way 29 shown in drawing 1 .

[0024] By inserting the toner conveyance screw member 8 into this toner conveyance way 29, and carrying out the rotation drive of this, the toner which fell to the screw member 8 is carried by the shaft orientations, and enters in the toner hopper section 6 from two or more openings 31. In this case, a toner enters in the toner hopper section 6 quantitatively over the shaft orientations of the toner conveyance screw member 8 at homogeneity.

[0025] In addition, since a wind is sent towards the pipe section 16 from the inside of the upper container 21 in case a dashboard 13 goes up, the flow operation towards the toner suction feeder 12 for a supplement of the toner in the toner supply container 11 ( drawing 1 ) can be promoted according to this wind-pressure operation.

[0026] In addition, when a dashboard 13 descends, a valve 23 closes and a valve 24 opens. If the toner T in the toner supply container 11 is altogether moved to the toner hopper section 6, rise-and-fall actuation of a dashboard 13 will stop. Moreover, when the capacity of the toner supply container 11 is larger, it is better than the capacity of the toner hopper section 6 to move a toner to every [ the specified quantity ] and the toner hopper section 6.

[0027] In this way, it connects with the toner supply container 11 and a developer (an example toner hopper section 6) 1 so that it may be open for free passage, respectively, the toner for a supplement in the toner supply container 11 is attracted compulsorily, and the toner suction feeder 12 for a supplement serves to generate suction airstream so that it may flow to a developer 1 side. Such a toner suction feeder 12 for a supplement is attached to a developer 1. the toner hopper section 6 -- omitting -- the toner suction feeder 12 for a supplement -- the toner T in the toner supply container 11 -- every [ the specified quantity ] -- it can also constitute so that the casing 50 of a developer 1 may be supplied soon.

[0028] According to this example, since a toner is automatically supplied towards a developer 1 from the toner supply container 11, a seal can tear off, it is necessary to do neither an activity nor the drawing activity of a shutter, and this kind of supply workability can be improved much more. Moreover, a hand is not further soiled with a toner, without soiling a perimeter environment with a toner.

[0029] By the way, to the inside of the bottom container 22 which the inside of the toner hopper section 6 shown in drawing 1 shows to drawing 3 , when sealing nature is bad, the suction nature of the toner from the pipe section 17 to into the bottom container 22 worsens. The opening 28 shown in drawing 1 , opening 31, etc. worsen the sealing nature.

[0030] Then, by the lock out member 32 as shows the connection of the toner suction feeder 12 for a supplement, and the toner hopper section 6 of a developer 1, i.e., the part of opening 28, to drawing 3 , if it blocks at least at the time of suction, the suction force of a toner can be strengthened.

[0031] The lock out member 32 will rock the lock out member 32 in an imaginary line location, if rocking displacement of between a continuous-line location and an imaginary line location is possible and a solenoid 33 is excited, if excitation of a solenoid is canceled, it will be the force of a spring 34, will be rocked in a continuous-line location, and will plug up opening 28. The free passage condition between the toner suction feeder 12 for a supplement and the toner hopper section 6 will be severed by this.

[0032] The toner which the lock out member 32 is in the opening blockade location shown as a continuous line while the dashboard 13 is performing rise-and-fall actuation, is this location, and flows collects on the lock out member 32. Here, it collects and time amount is measured beforehand, and after [ to take ] this time amount passes, excitation of a solenoid 33 is canceled. Then, the lock out member 33 releases opening 28, and the toner which is in this condition and collected falls into the toner conveyance way 29 ( drawing 1 R> 1).

[0033] By using such a lock out member 32, by the developer side to which the toner suction feeder 21 for a supplement is connected, when sealing nature is bad, the suction force of a toner can be strengthened. in addition, \*\* -- when there are no worries [ like ], this lock out member 32 is not necessarily needed. Moreover, the configuration relevant to the lock out member 32 is applicable also to each example explained below.

[0034] Drawing 5 shows the example of another toner suction feeder for a supplement. Although the rise-and-fall drive of the dashboard 13 is carried out in a previous example, the rise-and-fall drive of the top-cover section 43 of the upper container 41 is carried out in the thing of this example. That is, the rise-and-fall drive of the top-cover section 43 is carried out like what is shown in drawing 4 by the driving means which consists of a disk 35 and the link lever 36.

[0035] In case the top-cover section 43 and the upper container 41 are connected through a bellows 44 and the top-cover section 43 descends, a valve 24 closes, opening 20 is plugged up and the free passage condition inside each [ of the upper container 41 and the bottom container 42 ] is severed. A valve 23 opens to coincidence and the air in the upper container 41 enters in the pipe section 16 at it.

[0036] On the other hand, in case the top-cover section 43 goes up, a valve 24 opens and a valve 23 closes. If a valve 24 opens, the interior of each of the upper container 41 and the bottom container 42 will be in a free passage condition, and the suction airstream which goes in the bottom container 42 is produced from the pipe section 17, and the toner in the toner supply container 11 ( drawing 1 ) will flow in the bottom container 42, and will fall to the direction of the toner hopper section 6. In this example, ventilation and suction are performed separately.

[0037] By drawing 6 showing the toner suction feeder for a supplement of another example, this example sends in a wind in the direction of arrow-head B, generates the suction airstream 27, and is made to carry out flow fall of the toner by rotating fan equipment 37 in the direction of the toner hopper section 6. Also in the both sides of this example and a front example, the same function as the first example can be attained.

[0038] Although the toner supply container 11 is only the point of the pipe sections 16 and 17 of the toner suction feeder 12 for a supplement and it connects substantially here as shown in drawing 1 This connection is a cap type connection used as an opening blocked state, when it will be in an opening condition and the toner supply container 11 is connected to the toner suction feeder 12 for a supplement, when both of each other are connected, and it is not, and this cap type connection is prepared in the toner supply container 11.

[0039] Now, temporarily, as what pays its attention to the pipe section 17, the blockade cap 37 as shown in drawing 7 is attached in the hole dug in the toner supply container 11, and that hole is blocked by this blockade cap 37. The blockade cap 37 consists of the inner covering 38, a case 39, a seal member 40, and outside covering 45 grade, as shown also in drawing 8 .

[0040] The seal member 40 consists of foam, such as for example, foaming polyurethane, and has the notch of a cross-joint form in the center section. moreover, the outside covering 45 --

for example, elastic bodies, such as rubber, -- changing -- a center section -- the U.S. -- it has the notch of an impression. Furthermore, the inner covering 38 consists of film material, such as aluminum foil, and joining is suitably carried out to the case 39.

[0041] the condition that drawing 7 attached these members -- being shown -- \*\* -- the toner supply container 11 is equipped with the blockade cap 37 constituted like.

[0042] While setting the toner supply container 11 to the location of drawing 1, the blockade cap 37 is made to engage with the pipe section 17. Then, the pipe section 17 passes through the central notch of the outside covering 45, and the central notch of the seal member 40, and projects from the edge of a case 39. The inner covering 38 is fractured at this time.

[0043] The upper blockade cap 47 shown in drawing 1 as well as [ completely ] the blockade cap 37 is constituted, and if this blockade cap 47 is thrust into the pipe section 16 and it is made to penetrate, the point of the pipe section 16 projects in the toner supply container 11 similarly.

[0044] Anyway, the toner supply container 11 and the toner suction feeder 12 for a supplement will be in a free passage condition mutually. On the other hand, it is prevented that the central notch of both the members 40 and 45 that show it to drawing 8 when the part of the blockade caps 37 and 47 is extracted from each pipe section 17 and 16 is closed in order to remove the toner supply container 11, and the toner which remained in the toner supply container 11 leaks and comes out of a container 11.

[0045] In addition, if the part of the blockade caps 37 and 47 is not made to penetrate each pipe section, since the inner covering 38 has blocked the hole of a case 39 firmly, there is no possibility that the toner in a container 11 may leak out of a container.

[0046] An internal toner can be supplied only by inserting a toner supply container by preparing such a cap type connection in the toner supply container 11. And since the seal member 40, the outside covering 45, etc. catch each pipe sections 16 and 17 firmly with that elasticity, at the time of this supply, there is no possibility that a toner may disperse from a supply connection, and disgracing a perimeter environment, a man, etc. with a toner is lost at it.

[0047]

[Effect of the Invention] According to the configuration according to claim 1, since a toner is automatically supplied towards a developer from a toner supply container, a seal can tear off, it is necessary to do neither an activity nor the drawing activity of a shutter, and this kind of supply workability can be improved much more. Moreover, a hand is not further soiled with a toner, without soiling a perimeter environment with a toner.

[0048] According to the configuration according to claim 2, by the developer side to which the toner suction feeder for a supplement is connected, when sealing nature is bad, the suction force of a toner can be strengthened and a toner can be supplied certainly in a short time.

[0049] According to the configuration according to claim 3, as a supply activity of a toner, there is no possibility that a toner may begin to leak from both connection, in this case that what is necessary is just to equip a developer side with a toner supply container.

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to image formation equipment equipped with the developer which develops an electrostatic latent image with a toner.

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**PRIOR ART**

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[Description of the Prior Art] Generally with the developer which develops an electrostatic latent image with a toner, the toner for a supplement is supplied in a developer from this container by the thing of a configuration of that a toner is supplied using a toner supply container. Drawing 9 shows an example of the conventional toner supply container, and inside this container 101, as shown in drawing 10, the toner 102 for a supplement is contained.

[0003] Opening 103 is formed in the toner supply container 101, and this opening 103 is blocked by the seal 104. When performing toner supply, a developer is equipped with this container 101, a seal 104 is torn off, and the toner 102 for a supplement is dropped from opening 103 to the direction of a developer.

[0004] In addition, as shown in drawing 11, the shutter 106 formed in the lower part of the toner supply container 105 is pulled out in the direction of an arrow head, and there are some which drop the toner in a container 105 and are put in to the direction of the body of a developer from opening which is not illustrated.

[0005] If it is in such a supply method, the activity which tears off a seal or draws out a shutter is needed, and this kind of supply activity is very troublesome. Moreover, after supply, since opening of a toner supply container is turned down in order to drop a toner using gravity, if this toner supply container shall be taken out as it is, the toner adhering to a toner supply container will become easy to fall by vibration etc., and will soil a perimeter with a toner. Furthermore, the toner adhering to this container soils a hand with a toner about a finger etc. at the time of attachment and detachment of a toner supply container.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] According to the configuration according to claim 1, since a toner is automatically supplied towards a developer from a toner supply container, a seal can tear off, it is necessary to do neither an activity nor the drawing activity of a shutter, and this kind of supply workability can be improved much more. Moreover, a hand is not further soiled with a toner, without soiling a perimeter environment with a toner.

[0048] According to the configuration according to claim 2, by the developer side to which the toner suction feeder for a supplement is connected, when sealing nature is bad, the suction force of a toner can be strengthened and a toner can be supplied certainly in a short time.

[0049] According to the configuration according to claim 3, as a supply activity of a toner, there is no possibility that a toner may begin to leak from both connection, in this case that what is necessary is just to equip a developer side with a toner supply container.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] As the purpose of this invention can perform toner supply automatically, a seal tears it off, and it does an activity etc. an unnecessary thing, and is to offer the image formation equipment which enabled it to prevent the contamination to a perimeter environment, a man, etc. by the toner.

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MEANS

[Means for Solving the Problem] The developer which develops an electrostatic latent image with a toner in order that this invention may attain the above-mentioned purpose, It has the toner supply container which contains the toner for a supplement supplied to this developer. So that attachment and detachment are mutually free, and it may connect with a toner supply container so that it may be open for free passage to a toner supply container and a developer, respectively, and the toner for a supplement in a toner supply container may be attracted compulsorily and it may flow to a developer side The configuration of the image formation equipment which attached the toner suction feeder for a supplement which generates suction airstream to the developer is proposed.

[0008] In addition, if the connection between the toner suction feeder for a supplement and a developer is constituted at least so that a free passage may be severed by the lock out member at the time of suction, it is effective.

[0009] Moreover, it is effective if it will be in an opening condition when the connection between a toner supply container and the toner suction feeder for a supplement is mutually connected in both, it considers as the cap type connection used as an opening blocked state when a toner supply container is not connected, and it is the configuration which prepared this cap type connection in the toner supply container.

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EXAMPLE

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[Example] Hereafter, the example of this invention is explained to a detail according to a drawing.

[0011] Drawing 1 shows the toner supply section of the developer provided to the image formation equipment of this invention 1 example. It precedes explaining this toner supply section, and the outline of the configuration of a developer is made clear to below using drawing 2.

[0012] Opposite disposition of the developer 1 is carried out at the photo conductor drum 2 which is an example of latent-image support. The development sleeve 5 is supplied the developer of internal binary system being agitated by the churning roller 3 formed in the casing 50 of this developer 1, the churning paddle 4, etc. The developer of binary system is a developer which has a toner and a carrier. Development of the electrostatic latent image formed on the photo conductor drum 2 is presented with the developer on this supplied development sleeve 5. In addition, although this invention is applicable also to the thing using the one component system developer which does not contain a carrier, the developer using a fine-particles-like binary system developer shall be applied for convenience hereafter.

[0013] As mentioned above, although a developer 1 develops an electrostatic latent image with a toner, if the developer 1 provided to the image formation equipment of this example has the toner hopper section 6 connected to casing 50 and runs short of the toners in the developer in casing 50, the toner supply roller 7 of the toner hopper section 6 will begin rotation, and the toner T in the toner hopper section 6 will be supplied to the direction of the casing 50 of a developer 1.

[0014] The toner hopper section 6 is storing the toner T for supplying the casing 50 of a developer 1, and this reservoir toner T is agitated by rotation of the toner churning member 9. If the toner in the toner hopper section 6 is lost or the amount decreases, the purport to which exchange of the toner supply container which the detection equipment which is not illustrated detects this and mentions later is urged will be displayed on the control-panel section (un-illustrating) of image formation equipment.

[0015] Here, drawing 1 is drawing which is in the condition seen from arrow-head A, and made the cross section the toner supply section 10 of drawing 2.

[0016] In this drawing, a sign 11 shows the toner supply container which contained the toner T for a supplement supplied to a developer 1 inside. This toner supply container 11 may be called a toner bottle or a toner cartridge. 12 can show the toner suction feeder for a supplement, and this equipment 12 of each other can be freely detached and attached with the toner supply container 11. Drawing 1 shows the condition that the toner suction feeder 12 for a supplement was equipped with the toner supply container 11.

[0017] If the toner in the toner hopper section 6 is lost or it decreases, as stated even in the top, the display of the purport to which exchange of the toner supply container 11 is urged will be made. This display is seen, for example, the toner supply container 11 is extracted leftward to a user side.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the sectional view of the toner supply section of the developer provided to the image formation equipment of this invention 1 example.

[Drawing 2] It is the sectional view of the developer provided to image formation equipment same as the above.

[Drawing 3] It is the sectional view showing the concrete configuration of the toner suction feeder for a supplement.

[Drawing 4] It is drawing showing an example of the rise-and-fall driving means of the dashboard provided in the toner suction feeder for a supplement.

[Drawing 5] It is the sectional view showing the concrete configuration of the toner suction feeder for a supplement of another example.

[Drawing 6] Furthermore, it is the sectional view showing the concrete configuration of the toner suction feeder for a supplement of another example.

[Drawing 7] It is the sectional view showing the concrete configuration of a blockade cap.

[Drawing 8] It is the decomposition perspective view of a blockade cap.

[Drawing 9] It is the configuration perspective view of the conventional toner supply container.

[Drawing 10] It is the sectional view of this toner supply container.

[Drawing 11] It is the configuration perspective view of the toner supply container of another conventional example.

**[Description of Notations]**

1 Developer

11 Toner Supply Container

12 Toner Suction Feeder for Supplement

27 Suction Airstream

32 Lock Out Member

37 Cap

47 Cap

T Toner

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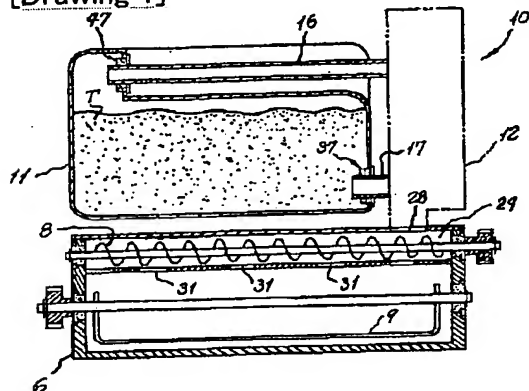
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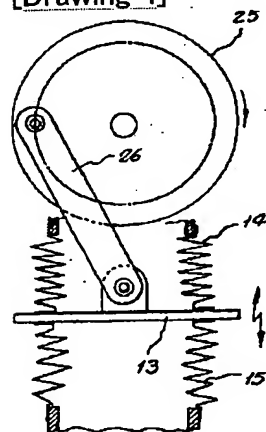
DRAWINGS

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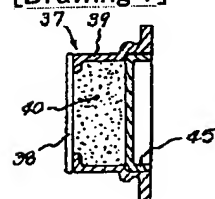
[Drawing 1]



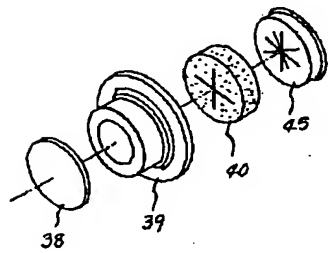
[Drawing 4]



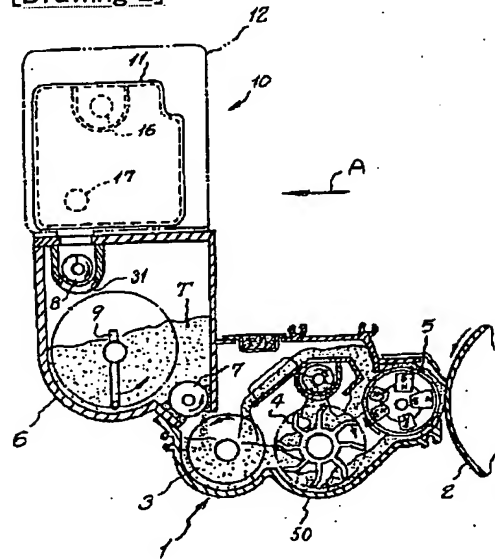
[Drawing 7]



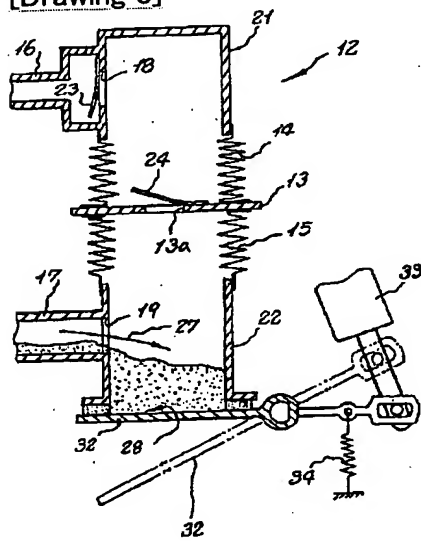
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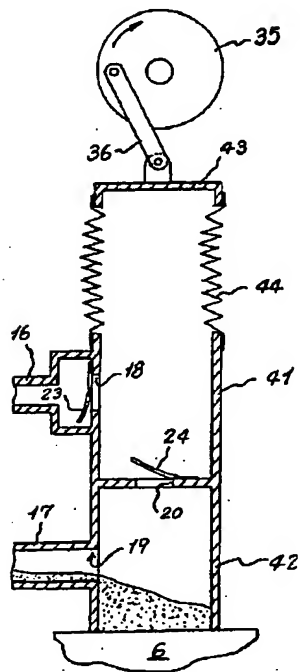
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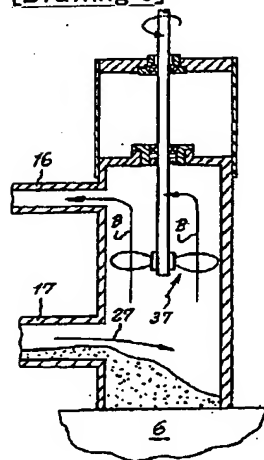
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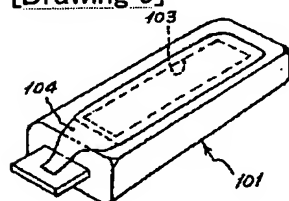




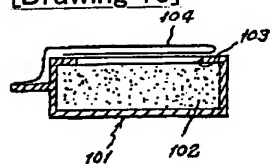
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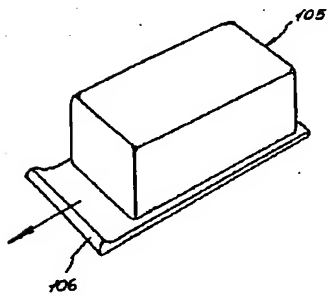
[Drawing 9]



[Drawing 10]



[Drawing 11]



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[Translation done.]

(19)日本国特許庁(JP)

(12) 公開特許公報(A)

(11)特許出願公開番号

特開平6-175490

(43)公開日 平成6年(1994)6月24日

(51)Int.Cl.<sup>5</sup>

G 0 3 G 15/08

識別記号

1 1 2

庁内整理番号

9222-2H

F I

技術表示箇所

審査請求 未請求 請求項の数3(全 6 頁)

(21)出願番号 特願平4-351368

(22)出願日 平成4年(1992)12月8日

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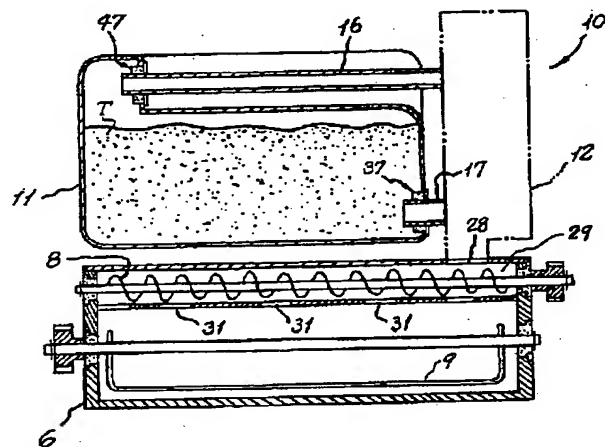
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(54)【発明の名称】 画像形成装置

(57)【要約】

【目的】 トナー補給を自動で行えるようにして、シールの引き剥がし作業などを不要のものとし、トナーによる、周囲環境や人などへの汚染を防止できるようにした画像形成装置を提供することである。

【構成】 内部に補充用トナーTを収納したトナー補給容器11と、現像装置のトナーホッパ部6との間に、補充用トナー吸引供給装置12を介設する。この補充用トナー吸引供給装置12は、トナー補給容器11から、トナーホッパ部6に向けての吸引空気流を発生させ、この吸引空気流に乗せて、補充用トナーTをトナーホッパ部6の方に流動させる。



## 【特許請求の範囲】

【請求項1】 静電潜像をトナーによって顕像化する現像装置と、該現像装置に供給する補充用トナーを収納するトナー補給容器とを有し、トナー補給容器とは互いに着脱自在となっていて、且つ、トナー補給容器と現像装置とに、それぞれ連通するように接続され、トナー補給容器内の補充用トナーが強制的に吸引され、現像装置の側へ流動するように、吸引空気流を発生させる補充用トナー吸引供給装置を、現像装置に付設したことを特徴とする画像形成装置。

【請求項2】 補充用トナー吸引供給装置と、現像装置との間の接続部は、少なくとも吸引時に、閉塞部材によって、連通が断たれるものとなっている請求項1に記載の画像形成装置。

【請求項3】 トナー補給容器と、補充用トナー吸引供給装置との間の接続部を、両者が互いに接続されているときは開口状態となり、トナー補給容器が接続されないときは開口封鎖状態となるキャップ式接続部とし、このキャップ式接続部をトナー補給容器に設けた請求項1又は2に記載の画像形成装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、静電潜像をトナーによって顕像化する現像装置を備えた画像形成装置に関するものである。

## 【0002】

【従来の技術】 静電潜像をトナーによって顕像化する現像装置で、トナーが補給される構成のものでは、一般的に、トナー補給容器を用い、この容器から補充用トナーを現像装置内に供給している。図9は従来のトナー補給容器の一例を示したものであり、この容器101の内部には図10に示すように補充用トナー102が収納されている。

【0003】 トナー補給容器101には開口103が設けられ、この開口103はシール104で封鎖されている。トナー補給を行うときは、かかる容器101を現像装置に装着し、シール104を引き剥がして開口103より補充用トナー102を現像装置の方へ落下させる。

【0004】 この他、図11に示すように、トナー補給容器105の下部に設けたシャッタ106を矢印方向に引き出して、図示されない開口より、容器105内のトナーを落として現像装置本体の方へ入れるものもある。

【0005】 このような補給方式にあつては、シールを引き剥がしたり、シャッタを引き抜いたりする作業が必要となり、この種の補給作業が誠に面倒なものとなっている。又、重力を利用してトナーを落下させるべく、トナー補給容器の開口を下にするので、補給後に、かかるトナー補給容器を、そのまま取り出すものとする、トナー補給容器に付着しているトナーが振動などで落下し易くなり、周囲をトナーで汚したりする。更に、トナー

補給容器の着脱時に、この容器に付着したトナーが指などにつき、手をトナーで汚したりする。

## 【0006】

【発明が解決しようとする課題】 本発明の目的は、トナー補給を自動で行えるようにして、シールの引き剥がし作業などを不要のものとし、トナーによる、周囲環境や人などへの汚染を防止できるようにした画像形成装置を提供することにある。

## 【0007】

10 【課題を解決するための手段】 本発明は上記目的を達成するため、静電潜像をトナーによって顕像化する現像装置と、該現像装置に供給する補充用トナーを収納するトナー補給容器とを有し、トナー補給容器とは互いに着脱自在となっていて、且つ、トナー補給容器と現像装置とに、それぞれ連通するように接続され、トナー補給容器内の補充用トナーが強制的に吸引され、現像装置の側へ流動するように、吸引空気流を発生させる補充用トナー吸引供給装置を、現像装置に付設した画像形成装置の構成を提案するものである。

20 【0008】 なお、補充用トナー吸引供給装置と、現像装置との間の接続部は、少なくとも吸引時に、閉塞部材によって、連通が断たれるように構成すると、効果的である。

【0009】 又、トナー補給容器と、補充用トナー吸引供給装置との間の接続部を、両者が互いに接続されているときは開口状態となり、トナー補給容器が接続されないときは開口封鎖状態となるキャップ式接続部とし、このキャップ式接続部をトナー補給容器に設けた構成とすると、効果的である。

## 30 【0010】

【実施例】 以下、本発明の実施例を図面に従って詳細に説明する。

【0011】 図1は、本発明一実施例の画像形成装置に具備される現像装置のトナー補給部を示したものである。このトナー補給部を説明するに先立ち、図2を用いて、現像装置の構成のあらましを以下に明らかにしておく。

【0012】 現像装置1は、潜像担持体の一例である感光体ドラム2に対向配備されている。この現像装置1のケーシング50内に設けられた攪拌ローラ3や、攪拌パドル4などによって内部の二成分系の現像剤が攪拌されつつ、現像スリーブ5に供給される。二成分系の現像剤はトナーとキャリアを有する現像剤である。この供給された現像スリーブ5上の現像剤は、感光体ドラム2上に形成された静電潜像の顕像化に供される。なお、本発明はキャリアを含まない一成分系現像剤を用いるものにも適用が可能であるが、以下、粉体状の二成分系現像剤を用いる現像装置を便宜上適用するものとする。

50 【0013】 上述のように、現像装置1は静電潜像をトナーによって顕像化するものであるが、本例の画像形成

装置に具備される現像装置1は、ケーシング50に接続されたトナーホッパ部6を有し、ケーシング50内の現像剤中のトナーが不足すると、そのトナーホッパ部6のトナー補給ローラ7が回転を始め、トナーホッパ部6内のトナーTが現像装置1のケーシング50の方に補給される。

【0014】トナーホッパ部6は、現像装置1のケーシング50に補給するためのトナーTを貯留しており、この貯留トナーTは、トナー攪拌部材9の回転により、攪拌される。トナーホッパ部6内のトナーが無くなるか、若しくは、その量が少なくなると、図示していない検知装置がこれを検知し、後述するトナー補給容器の交換を促す旨が、画像形成装置の操作パネル部（不図示）上に表示される。

【0015】ここで、図1は、図2のトナー補給部10を、矢印A方向から見た状態で、断面にした図である。

【0016】この図において、符号11は、現像装置1に供給する補充用トナーTを内部に収納したトナー補給容器を示す。このトナー補給容器11は、トナーボトル又はトナーカートリッジと呼ばれることもある。12は補充用トナー吸引供給装置を示し、この装置12は、トナー補給容器11と互いに着脱自在となっている。図1は、トナー補給容器11が補充用トナー吸引供給装置12に装着された状態を示している。

【0017】トナーホッパ部6内のトナーが無くなるか、若しくは、少なくなると、上でも述べたように、トナー補給容器11の交換を促す旨の表示がなされる。この表示を見て、例えば、ユーザ側において、トナー補給容器11を左方向へと抜き出す。この抜き出される容器11内には、勿論、前に補給が終っているので、トナーは無い。次いで、図の如く、補充用トナーTが収納された新しいトナー補給容器11が、図の位置に装着される。この装着状態で、補充用トナー吸引供給装置12が作動態勢にされる。

【0018】補充用トナー吸引供給装置12は、この主要構成が図3に示すように上容器21と、下容器22とに分かれており、これらの間には両者を仕切る仕切板13が設けられている。

【0019】仕切板13は、ジャバラ14、15を介して、それぞれ上容器21と下容器22とに連結され、昇降自在となっている。上容器21にはパイプ部16が設けられ、これはトナー補給容器11の方に延び出ている（図1）。パイプ部16と上容器21とのつなぎ目の壁部には開口18が穿たれると共に、弁23が設けられている。

【0020】又、仕切板13にも、同様に開口13aが穿たれ、且つ、上容器21内に位置させた弁24が設けられている。仕切板13は、例えば、図4に示すような円板25やリンク杆26などより成る駆動手段によって昇降駆動される。円板25は図示されないモータによ

て回転駆動され、この円板25と仕切板13とにリンク杆26の各端部が枢着され、円板25が図示矢印方向に回転すると、リンク杆26を介して、仕切板13が昇降移動する。

【0021】このような駆動手段によって、図3に示す仕切板13が上昇するときは、開口18側の弁23が開くと共に、仕切板13の方の弁24が閉じる。この際、上容器21内の空気がパイプ部16内に流入する。すなわち、パイプ部16に向けて、上容器21内から風が送られるのである。

【0022】下容器22にはパイプ部16と平行するようにパイプ部17が設けられ、これはパイプ部16よりも頗る短くなっている（図1）。そして、パイプ部17と上容器22のつなぎ目の壁部には開口19が穿たれている。

【0023】仕切板13が上昇する際、前記送風が行われると同時に、パイプ部17から下容器22内に空気が流入する。すなわち、パイプ部17内から下容器22内に向けて吸引空気流27が生じるのである。トナー補給容器11内の補充用トナーはかかる吸引空気流に乗って、下容器22内に流動し、下容器22の下端開口28より、図1に示すトナー搬送路29内に落下する。

【0024】かかるトナー搬送路29内にはトナー搬送スクリー部材8が挿設され、これが回転駆動されることによって、スクリー部材8に落ちたトナーはその軸方向に運ばれ、複数の開口31よりトナーホッパ部6内に入る。この場合、トナー搬送スクリー部材8の軸方向にわたって量的に均一にトナーがトナーホッパ部6内に入る。

【0025】なお、仕切板13が上昇する際、上容器21内からパイプ部16に向けて風が送られるため、この風圧作用によって、トナー補給容器11（図1）内のトナーの、補充用トナー吸引供給装置12に向けての流動作用を促進させることができる。

【0026】なお、仕切板13が下降するときは、弁23が閉じ、弁24が開く。トナー補給容器11内のトナーTが全てトナーホッパ部6に移されると、仕切板13の昇降動作が停止する。またトナーホッパ部6の容量よりも、トナー補給容器11の容量の方が大きいようなときは、所定量ずつ、トナーホッパ部6へトナーを移すようにするとよい。

【0027】補充用トナー吸引供給装置12は、このようにトナー補給容器11と、現像装置（実施例ではトナーホッパ部6）1とに、それぞれ連通するように接続され、トナー補給容器11内の補充用トナーが強制的に吸引され、現像装置1の側に流動するように、吸引空気流を発生させる働きをする。このような補充用トナー吸引供給装置12が現像装置1に付設されるのである。トナーホッパ部6を省略し、補充用トナー吸引供給装置12によって、トナー補給容器11内のトナーTを所定量ず

つ、直に現像装置1のケーシング50に補給するように構成することもできる。

【0028】本実施例によれば、トナー補給容器11から現像装置1に向けてトナーが自動的に補給されるので、シールの引き剥がし作業や、シャッタの引き抜き作業などをしないで済み、この種の補給作業性を一段と改善することができる。又、周囲環境をトナーで汚したりすることもなく、更に、トナーで手を汚したりすることもない。

【0029】ところで、図1に示すトナーホッパ部6内10が、図3に示す下容器22内に対して密閉性が悪い場合、パイプ部17から下容器22内へのトナーの吸引力が悪くなる。図1に示す開口28や、開口31などは、その密閉性を悪くするものである。

【0030】そこで、補充用トナー吸引供給装置12と、現像装置1のトナーホッパ部6との接続部、すなわち、開口28の部位を、図3に示すような閉塞部材32で、少なくとも吸引時に封鎖してしまうと、トナーの吸引力を強めることができる。

【0031】閉塞部材32は実線位置と、仮想線位置との間を揺動変位可能となっていて、ソレノイド33が励磁されると、閉塞部材32は仮想線位置に揺動し、ソレノイドの励磁が解除されると、バネ34の力で、実線位置に揺動し、開口28を塞ぐ。これによって、補充用トナー吸引供給装置12と、トナーホッパ部6との間の連通状態は断たれることとなる。

【0032】閉塞部材32は、例えば、仕切板13が昇降動作を行っているときは、実線で示す開口封鎖位置にあり、この位置で、流動して来るトナーは閉塞部材32上に溜る。ここで、例えばかかる溜り時間を予め計測しておき、この時間が経過したのち、ソレノイド33の励磁を解除する。すると、閉塞部材33は開口28を解放し、この状態で、溜ったトナーがトナー搬送路29（図1）内に落ちる。

【0033】このような閉塞部材32を用いることにより、補充用トナー吸引供給装置21が接続される現像装置側で、密閉性が悪い場合に、トナーの吸引力を強めることができる。なお、かような心配がない場合はかかる閉塞部材32は必ずしも必要としない。また閉塞部材32に関連する構成は、以下に説明する各実施例にも適用40

【0034】図5は別の補充用トナー吸引供給装置の例を示すものである。先の例では仕切板13が昇降駆動されるのであるが、本例のものでは、上容器41の上蓋部43が昇降駆動されるようになっている。すなわち、上蓋部43は円板35とリンク杆36より成る駆動手段によって、図4に示すものと同様に、昇降駆動される。

【0035】上蓋部43と上容器41とはジャバラ44を介して連結され、上蓋部43が下降する際、弁24が50

閉じ、開口20が塞がれて、上容器41と下容器42との各内部の連通状態が断たれる。同時に、弁23が開き、上容器41内の空気がパイプ部16内に入る。

【0036】これに対し、上蓋部43が上昇する際には、弁24が開き、弁23が閉じる。弁24が開くと、上容器41と下容器42との各内部が連通状態になり、且つ、パイプ部17から、下容器42内に向かう吸引空気流を生じ、トナー補給容器11（図1）内のトナーが下容器42内に流動し、トナーホッパ部6の方へ落下する。この例では、送風と吸引とが別々に行われるようになっている。

【0037】図6は別の例の補充用トナー吸引供給装置を示し、この例は、ファン装置37を回転させることにより、矢印B方向に風を送り込み、吸引空気流27を発生させて、トナーをトナーホッパ部6の方に流動落下させるようにしたものである。本例や、前の例の双方においても、初めの例と同じような機能を達成することができる。

【0038】ここで、図1に示すように、トナー補給容器11は、補充用トナー吸引供給装置12のパイプ部16、17の先端部位で、実質的に接続されているのであるが、この接続部は、両者が互いに接続されているときは、開口状態となり、トナー補給容器11が補充用トナー吸引供給装置12に接続されいないときは開口封鎖状態となるキャップ式接続部となっていて、このキャップ式接続部がトナー補給容器11に設けられている。

【0039】今、仮に、パイプ部17に着目するものとして、トナー補給容器11に穿った穴には、図7に示すような封鎖キャップ37が取り付けられ、この封鎖キャップ37で、その穴が封鎖されている。封鎖キャップ37は、図8にも示すように、内カバー38、ケース39、シール部材40及び外カバー45等で構成されている。

【0040】シール部材40は、例えば発泡ポリウレタンなどの発泡体より成り、中央部に十字形の切欠きをもつものとなっている。又、外カバー45は、例えばゴムなどの弾性体より成り、中央部に米印形の切欠きをもつものとなっている。更に、内カバー38は、例えばアルミ箔などのフィルム材より成り、ケース39に適宜、溶着されている。

【0041】図7はこれらの部材を組み付けた状態を示し、がように構成される封鎖キャップ37がトナー補給容器11に装着されるのである。

【0042】トナー補給容器11を図1の位置にセットする間で、その封鎖キャップ37をパイプ部17に係合させる。すると、パイプ部17は外カバー45の中央切欠き部や、シール部材40の中央切欠き部を通り抜け、ケース39の端部より突出する。このとき、内カバー38は破断する。

【0043】図1に示す上側の封鎖キャップ47も、封

鎖キャップ37とまったく同様に構成され、パイプ部16に、かかる封鎖キャップ47を突き刺して貫通させると、同様に、パイプ部16の先端部がトナー補給容器11内に突出する。

【0044】いずれにしても、トナー補給容器11と、補充用トナー吸引供給装置12とが互いに連通状態となるのである。これに対し、トナー補給容器11を外すべく、封鎖キャップ37、47の部位を、それぞれのパイプ部17、16から抜き出すと、図8に示す両部材40、45の中央切欠き部が塞がって、トナー補給容器11内に残っていたトナーが容器11外に洩れ出ることが防止される。

【0045】なお、封鎖キャップ37、47の部位に、各パイプ部を貫通させなければ、内カバー38がしっかりとケース39の穴を封鎖しているのので、容器11内のトナーが容器外に洩れるおそれはない。

【0046】このようなキャップ式接続部を、トナー補給容器11に設けることで、トナー補給容器を差し込むだけで、内部トナーを補給することができる。そして、この補給時には、シール部材40や外カバー45などが、その弾性で各パイプ部16、17をしっかりと捕捉するので、補給接続部からトナーが飛散するおそれがなく、周囲環境や人などをトナーで汚したりすることがなくなる。

【0047】

【発明の効果】請求項1に記載の構成によれば、トナー補給容器から現像装置に向けてトナーが自動的に補給されるので、シールの引き剥がし作業や、シャッタの引き抜き作業などをしないで済み、この種の補給作業性を一段と改善することができる。又、周囲環境をトナーで汚したりすることなく、更に、トナーで手を汚したりすることもない。

【0048】請求項2に記載の構成によれば、補充用トナー吸引供給装置が接続される現像装置側で、密閉性が悪い場合に、トナーの吸引力を強めることができ、トナ\*

\*ーを短時間で確実に補給することができる。

【0049】請求項3に記載の構成によれば、トナーの補給作業としては、トナー補給容器を現像装置側に装着するだけで良く、この際、両者の接続部から、トナーが洩れ出すおそれがない。

【図面の簡単な説明】

【図1】本発明一実施例の画像形成装置に具備される現像装置のトナー補給部の断面図である。

【図2】同上画像形成装置に具備される現像装置の断面図である。

【図3】補充用トナー吸引供給装置の具体的構成を示す断面図である。

【図4】補充用トナー吸引供給装置に具備される仕切板の昇降駆動手段の一例を示す図である。

【図5】別の例の補充用トナー吸引供給装置の具体的構成を示す断面図である。

【図6】更に別の例の補充用トナー吸引供給装置の具体的構成を示す断面図である。

【図7】封鎖キャップの具体的な構成を示す断面図である。

【図8】封鎖キャップの分解斜視図である。

【図9】従来のトナー補給容器の構成斜視図である。

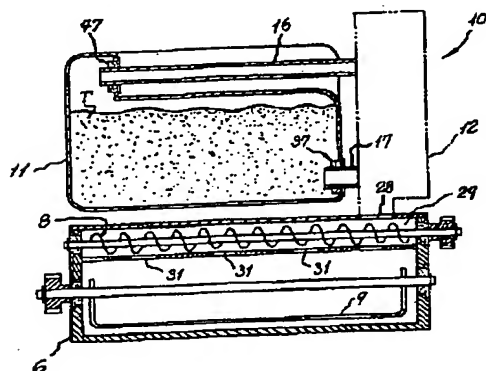
【図10】同トナー補給容器の断面図である。

【図11】別の従来例のトナー補給容器の構成斜視図である。

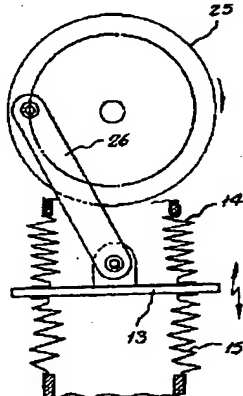
【符号の説明】

- 1 現像装置
- 11 トナー補給容器
- 12 補充用トナー吸引供給装置
- 27 吸引空気流
- 32 閉塞部材
- 37 キャップ
- 47 キャップ
- T トナー

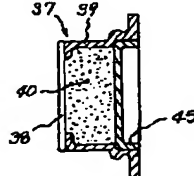
【図1】



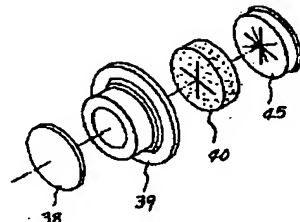
【図4】



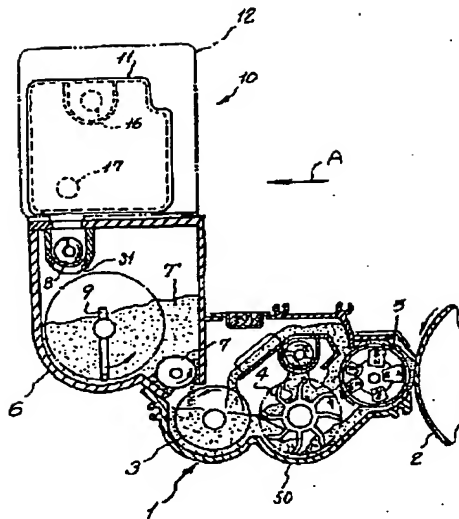
【図7】



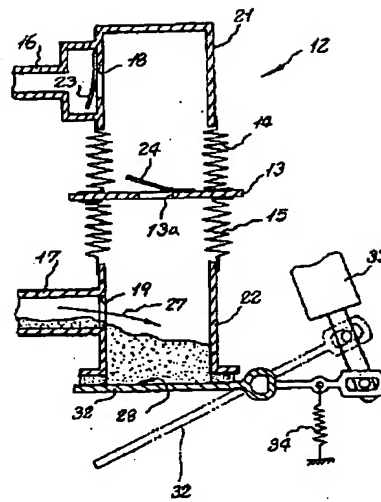
【図8】



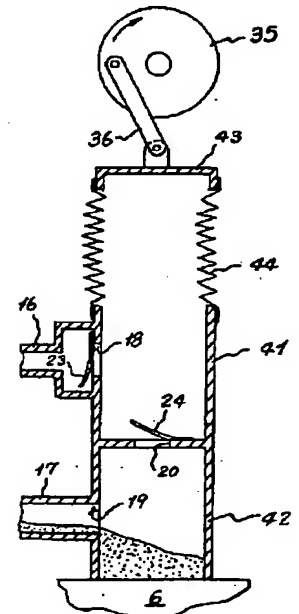
【図2】



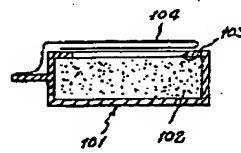
【図3】



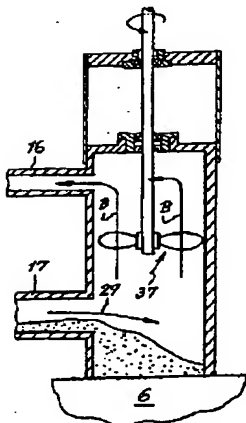
【図5】



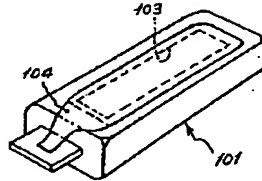
【図10】



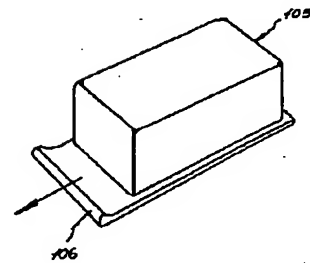
【図6】



【図9】



【図11】





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